

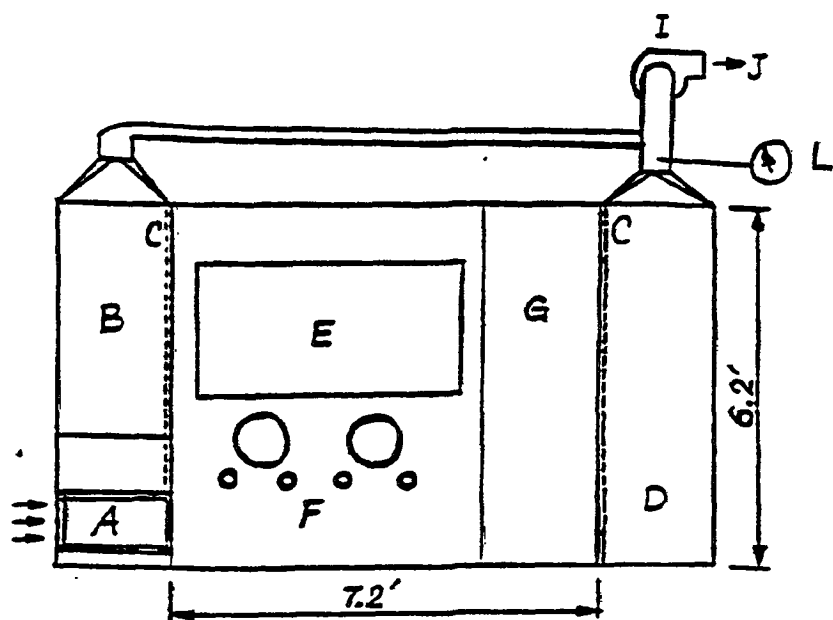
EVALUATION OF THE PERFORMANCE OF AN ASTHMA CHALLENGE CHAMBER
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A large number of substances can cause allergic reactions. Some causes, such as molds, dust, or pollen, can be determined easily by skin scratch, intradermal, or blood tests. But some work related irritants and chemicals can cause occupational asthma. These chemicals must be determined in the field or diagnosed in a relative environment as determined by pulmonary function performance. Thus, an Asthma Challenge Chamber was constructed and evaluated to test for chemicals known to produce occupational asthma.

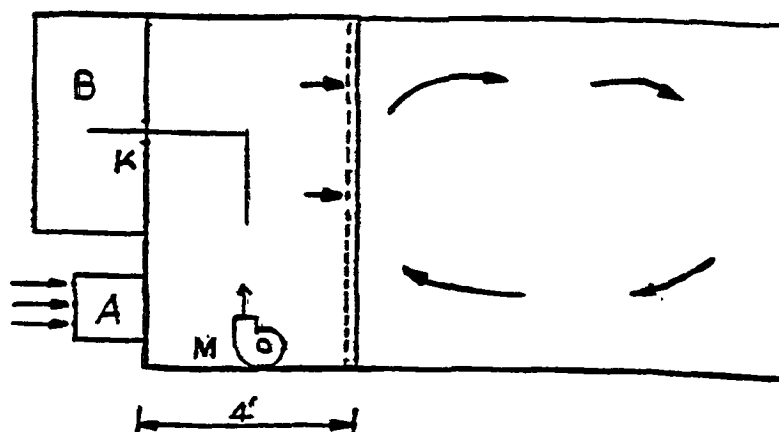
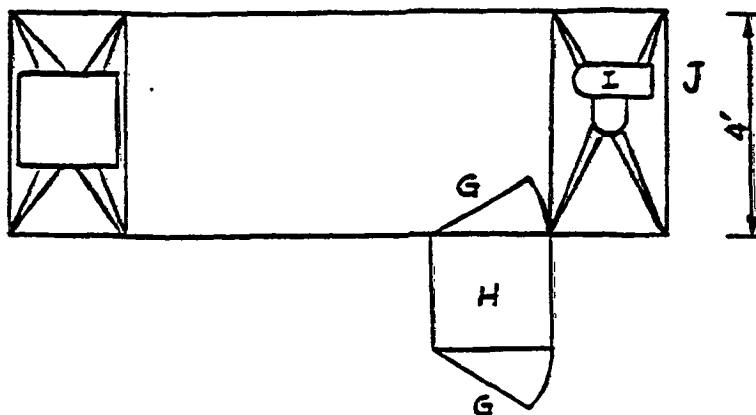
The chamber is lined with stainless steel and has an observation window. Entering room air is filtered to remove chemicals and dusts. It is operated at constant laminar flow and is also maintained at a slight negative pressure to prevent leakage. Vapors and gases of four chemicals, toluene diisocyanate (TDI), methylene bisphenylisocyanate (MDI), hexamethylene diisocyanate (HDI) and formaldehyde, were generated according to OSHA's Permissible Exposure Limit (PEL) and Time-Weighted Average (TWA) concentration by bubbler purge/trap or syringe pump flash evaporator generation systems. For TDI, MDI and HDI, target concentration were monitored by MDA-7100 Toxic Gas Monitor and compared with the Marcali spectrophotometric method. Formaldehyde concentration is detected by a Miran IA Gas Analyzer and calibrated by NIOSH analytical method number P&CAM125.

During the monitoring, chamber flow is controlled at 180 cubic feet per minute and the target chemical concentrations are all within 7% confidence interval. Stability of concentration is obtained within 5 minutes after generation. Exhaustion of chemicals are reached 4 minutes after stopping generation. The patient's challenge response and psychological effects can be measured by pulmonary function testing and psychological evaluation. In a work environment, multiple chemicals are found. With precise, steady state exposure, the Challenge Chamber can be a good evaluation and diagnostic tool to pinpoint specific chemicals that cause asthma in the workplace.

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- A. INTAKE FILTER
- B. HOOD
- C. DIFFUSION SCREEN
- D. PLENUM
- E. OBSERVATION WINDOW
- F. PORTS
- G. DOOR
- H. AIRLOCK
- I. BLOWER
- J. EXHAUST
- K. INJECTION PORT
- L. PRESSURE GAUGE
- M. MIXING FAN



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